

AUGUST 2024

Over the Brink

Escalation Management in a Protracted War

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About the Defense Program

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Acknowledgments

We would like to thank the following: the numerous subject matter experts on both U.S. deterrence approaches and Chinese nuclear thinking who took time from their busy schedules to meaningfully engage with the study team. We greatly benefited from their insights and perspectives on troubling and important topics. To those who participated in our tabletop exercises, your willingness to step outside of today's strategic baseline and consider this unsettling future helped to simultaneously expand and solidify our thinking. To our CNAS colleagues Becca Wasser, Molly Campbell, and Hannah Dennis for their help in designing and executing the tabletop exercises; and our excellent publications team: Maura McCarthy, Caroline Steel, Melody Cook, and Rin Rothback, for helping us get this over the line. For reviewing the paper and providing their thoughts, feedback, and edits: Billy Fabian, Cristina Garafola, and Greg Weaver.

The Defense Threat Reduction Agency (DTRA), as part of the Strategic Trends Research Initiative, sponsors strategic research projects under Broad Agency Announcement HDTRA1-22-S-0004. DTRA sponsored the Center for New American Security to conduct this research examining escalation management in a protracted conflict with a specific focus on coercion and competition. This report explores the potential for People's Republic of China (PRC) theater nuclear use as part of a war termination strategy. The views expressed herein are those of the authors and do not necessarily reflect the official policy or position of the DTRA, the U.S. Department of Defense, or the U.S. Government.

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Executive Summary

A new era of nuclear deterrence is taking shape in the Indo-Pacific theater. As the People's Republic of China (PRC) dramatically expands and modernizes its nuclear arsenal, the risks of PRC nuclear coercion and escalation are evolving. Building on the authors' prior work on U.S.-PRC nuclear escalation risks and protracted U.S.-PRC conflict, this report examines the United States' ability to manage nuclear coercion in a hypothetical protracted conflict over Taiwan. To this end, the authors conducted two tabletop exercises (TTXs) and supplementary research to better understand the challenges of U.S.-PRC intrawar deterrence.

Findings Summary

This study finds that a hypothetical, protracted U.S.-PRC conflict creates conditions under which nonstrategic nuclear weapons use is both appealing to the PRC and difficult to manage for the United States. Moreover, once nuclear escalation in the Indo-Pacific occurs, reciprocal tactical nuclear exchanges may continue, but not necessarily lead to general nuclear war. These findings reflect the fundamental differences of deterrence in the emerging Indo-Pacific era, where distinct geography, targets, and capabilities make limited nuclear escalation potentially more tolerable than in the Cold War era.

The authors further found that the United States is currently ill-equipped in doctrine, capabilities, and concepts to manage this nuclear future. Relying on submarines and dual-capable fighters and bombers for signaling and employment, the United States may encounter issues related to platform vulnerability, signaling visibility, and conventional warfighting. Additionally, the TTXs highlighted major divergences of opinion on nuclear retaliation that will likely challenge U.S. decision-makers and that may result in capitulation, compromises, or ineffective counter-coercion approaches.

This report also illuminates a critical area for future study: the role of allies and partners within a broader

U.S. escalation management strategy. The United States needs to maintain alliance cohesion and the credibility of extended deterrence represents a logical target for PRC nuclear coercion, particularly when facing a disadvantageous conventional balance. Across the TTXs, nuclear strikes on U.S. allies were viewed as key strategic turning points. For these reasons, strengthening extended deterrence and improving escalation management coordination are crucial areas for future study.

Methodology

The authors developed and executed two TTXs, conducted supplemental research, and crafted a novel escalation model linking conventional warfighting to nuclear deterrence.

The study's TTXs each posited a hypothetical nuclear employment logic in which China sought to achieve favorable conflict termination through limited nuclear escalation. The first case, *Spike the Ball*, posited PRC limited nuclear use when China was marginally advantaged. The second, *Cold Stop*, posited limited PRC nuclear use when China was marginally disadvantaged. Following a scripted Red nuclear strike against multiple U.S. military targets at the conclusion of the first move, both games moved into traditional free play for two to three turns to test U.S. ability to manage and respond to Chinese nuclear escalation.

Building on analysis of the TTXs and supplemental research, the authors subsequently developed a novel escalation model. This "conventional-nuclear crossfade" framework underscores how nuclear escalation risks are nonlinear and how, in a protracted Sino-American conflict in the Indo-Pacific, an inversion of conventional and nuclear escalation risks may render limited nuclear exchanges both more credible and more tolerable. The escalation risks associated with conventional and nuclear actions are likely to blur, lending nonstrategic nuclear weapons an uncomfortable yet plausible logic for employment.

Key Findings and Recommendations

FINDING

Protracted conventional conflict with the PRC heightens the potential for nonstrategic nuclear weapons use due to decreasing conventional capabilities, increasing nuclear signaling and use options, and the nature of the theater. Protraction's reduction of preferred conventional munitions increases the perceived utility of higher-efficiency nuclear weapons. Additionally, the Indo-Pacific's archipelagic and maritime nature lends itself to small numbers of air-burst weapons compared to the Cold War confrontation in central Europe. These differences increase the perceived tolerability of nuclear use.

RECOMMENDATIONS

- *Educate senior U.S. decision-makers on the troubling logic of theater nuclear use and corresponding limits on U.S. responses.* Senior decision-makers must look beyond the PRC's longstanding declaratory policy and understand both the dangerous potential branches of Chinese nuclear futures and corresponding limitations on U.S. responses.
- *Pursue dialogue and confidence-building measures where possible with the PRC, even when there is a perception of limited movement.* The United States and its allies should continue to engage with PRC interlocutors wherever possible to create pathways for dialogue and understanding. In doing so, U.S. diplomats may be able to achieve real progress on sensitive, nuclear-adjacent issues.

FINDING

U.S. regional allies are a clear strength and potential vulnerability. U.S. allies and partners are key in deterring China and maintaining a "free and open Indo-Pacific." China may use nuclear arms to undermine or break U.S. extended deterrence commitments and thus the underlying alliances.

RECOMMENDATION

- *Hold detailed planning conversations with Japan and Australia on responses to nuclear use.* U.S. diplomats and senior military officials must begin forthright discussions on the implications of PRC nuclear expansion for U.S. allies and partners. This level of coordination must include plans for resilience, redundancy, and forces operating in contaminated environments.

FINDING

The United States lacks the doctrine, capabilities, and concepts to manage the conventional-nuclear crossfade. U.S. nuclear thinking and systems remain tied to the Cold War, and current capabilities suffer from a lack of clear signaling tools and employment difficulties.

RECOMMENDATIONS

- *Fully integrate nuclear activities into U.S. planning and exercises, not just as a "last day" or stand-alone exercise.* Reviving this skill for great power competition and potential U.S.-PRC conflict generates a powerful signal that U.S. forces are alert to the threat of nuclear escalation and lessens the operational advantages that an adversary may seek to gain through limited nuclear use.
- *Develop and exercise operational concepts for visible theater nuclear generation.* Given the inherent signaling limitations of ballistic missile submarines, the U.S. Air Force must develop the tactics, techniques, and procedures to move nonstrategic nuclear weapons quickly and safely to theater and mate with forward-deployed aircraft.
- *Improve both the capabilities and capacities of conventional munitions.* To avoid a dangerous dependence on theater nuclear arms, the United States must fund expanded conventional munitions capabilities to include area-effects weapons, "good enough" weapons that can be produced en masse, and a substantially higher capacity of preferred conventional munitions.
- *Consider expanded theater nuclear weapons capabilities.* The United States likely lacks the theater nuclear capabilities necessary to engage in effective conflict management and forestall successful nuclear coercion. For this reason, the United States should consider the development of a small number of nuclear-tipped antiship capabilities to increase the flexibility of U.S. theater nuclear capabilities and better align legacy Cold War capabilities with the Indo-Pacific age.

Introduction

During the Cold War, Western scholars labored to develop theories and approaches for managing escalation and gaining advantage in the competition between the United States and the Soviet Union.¹ While most of these theorists focused on preventing conflict, a smaller subset of scholars considered more pernicious questions: how might a conventional war escalate to the nuclear level—and would nuclear war be controllable?² Thankfully, these theories were never put into action and this line of inquiry was truncated by the fall of the Berlin Wall and the end of the Cold War era.

Strategists in the United States are currently asking many of these same questions about competition and potential conventional conflict with the People's Republic of China (PRC).³ While a variety of experts have studied the PRC's conventional modernization for over a decade, consideration of the nuclear dimensions of the PRC's evolving military capabilities has, until recently, been largely relegated to a small community of specialists. This relegation can be attributed in part to China's minimalist nuclear strategy, which emphasizes assured deterrence and no first use, and to its relative lack of nuclear warfighting capabilities.⁴

Over the past five years, it has become clear that the PRC is dramatically expanding both the quantity and quality of its strategic nuclear forces. This includes new mobile missile systems (DF-31AG and DF-41), enhancements to submarine-launched ballistic missiles (JL-3), modernization of the air leg (H-6N), and most dramatically, construction of over 300 hardened intercontinental ballistic missile (ICBM) silos.⁵ The 2023 China Military Power Report suggests that the PRC will have 1,000 operational warheads by 2030.⁶ As recently as 2020, the U.S. Department of Defense (DoD) estimated that the PRC's operational stockpile was "in the low 200s," and claimed that it grew to 500 warheads in 2023.⁷

PRC leadership has clearly decided on markedly increasing their nuclear capabilities but has failed to explain the overarching strategic rationale for this expansion. Many U.S. analysts view this lack of strategic clarity with alarm.⁸ At a minimum, it increases the chances of misunderstanding and misperception. While the exact rationale behind the PRC's qualitative and quantitative nuclear expansion is unclear, these efforts will enable China to potentially change its current nuclear strategy of assured deterrence. There are signs that the People's Liberation Army (PLA) is moving toward a launch-on-warning posture, and increased



The DF-26 launcher offers the People's Republic of China options to potentially change its nuclear strategy. Nonstrategic nuclear arms fit neatly into the PLA's conventional warfighting approaches and are being discussed in Chinese military writings. (Andy Wong/Pool via Getty Images)

capability and capacity creates previously unavailable strategic options for PRC leadership.⁹ Regardless of the state of PRC nuclear strategy today, presently observed changes in its arsenal create the possibility of future changes in its strategy. The Indo-Pacific era thus requires a reevaluation of the strategic tools built during the Cold War.

It is this uncertainty that compels U.S. strategic analysts to ask uncomfortable “what if” questions about PRC nuclear strategy. These questions are most concerning when considering how relative strategic parity influences the stability-instability paradox and opens the window for discrete, nonstrategic nuclear strikes.¹⁰ The PRC’s nonstrategic nuclear capabilities are particularly opaque. Much has been written about the dual-capable nature of the DF-26 IRBM and the potential to quickly “hot swap” the payload between conventional and nuclear warheads.¹¹ There is very little to no publicly available information on the quantity of PRC tactical warheads. It is apparent that the PRC has dramatically expanded the quantity of DF-26 launchers over the past five years.¹² While details on PLA thinking remain sparse, small-yield, precise nonstrategic nuclear arms neatly fit into the PLA’s conventional warfighting approaches and are being discussed in Chinese military writings.¹³

A prior Center for a New American Security (CNAS) Defense Program study, *Avoiding the Brink*, began to explore many of these issues in a Taiwan invasion scenario. It concludes that while an increased PRC nuclear arsenal improved its coercive leverage by providing additional options and second-strike capabilities, the PRC would likely see little advantage in pursuing such a strategy early in a conflict given its expansive conventional strike capabilities.¹⁴ If nuclear coercion or employment were to occur, the authors of *Avoiding the Brink* suggest that both sides could struggle with credibility. Under these conditions, the United States would see value in its continued strategic quantitative advantage and the PRC would perceive an asymmetry of resolve—that is, the PRC is more invested in conquering Taiwan than the United States is in defending it.¹⁵ In addition, this work observed that the nature of the potential coercive nuclear targets likely favors the PRC, given the asymmetry between the U.S. position operating from forward locations and the PLA position operating from its homeland.¹⁶ Crucially, *Avoiding the Brink* concludes that, despite not observing significant pathways for nuclear coercion and use early in a conflict, “there might be increased pressure to use nuclear weapons as conventional weapons stocks became depleted or in an effort to end the war on favorable terms.”¹⁷

A subsequent CNAS Defense program study, *Rolling the Iron Dice*, explores the twisted, confusing logic of protracted war. *Iron Dice* does not focus on the interdependent relationship between the depletion of conventional weapons, the need to terminate the conflict, or the role of nonstrategic nuclear weapons. Instead, it concludes:

A risk-acceptant actor could leverage a precisely targeted, low-yield weapon to push a conflict to the very edge of the nuclear cliff, leaving the other actor with few, if any, options short of strategic escalation.¹⁸ The potential for conflict expansion to the tactical nuclear domain in the pursuit of conflict termination is largely beyond the scope of this immediate paper. It is . . . a crucial area for further study.¹⁹

This body of work reveals important questions. How would protracted warfare change the nuclear escalation dynamic between the United States and the PRC? How does the deterrence landscape shift when both sides possess mature precision strike capabilities? Are there plausible logics behind asymmetric nuclear escalation for the PRC in a protracted war scenario?²⁰ This report attempts to provide some answers to these questions.

This research, funded by the Defense Threat Reduction Agency (DTRA), creates a novel, linked model of escalation, integrating the concepts of advanced conventional warfighting with nuclear deterrence, and uses two tabletop exercises (TTXs) to increase understanding

Unfortunately, strategies of asymmetric, coercive escalation for war control and, potentially, termination, represent a plausible future.

of escalation dynamics in a protracted war scenario. The TTXs explore how the PRC could use nuclear coercion in two subtly different protracted war scenarios that extend an initial conflict over Taiwan well into a second month.²¹ Ultimately, this study seeks to understand the implications of a plausible and highly dangerous future.

The study’s authors acknowledge that many of the approaches adopted in these TTXs by both the Red and Blue teams diverge from current concepts. This is especially true with respect to PRC strategy, where much remains unclear about the objective of its nuclear modernization efforts. Unfortunately, strategies of

asymmetric, coercive escalation for war control and, potentially, termination, represent a plausible future.²²

This report has four major components. The first summarizes the key findings and insights from this study. The second reviews the approach that the team took, describes the hypothetical PRC nuclear use theories that were developed to support the TTXs, and outlines a framework for understanding the escalation relationship between advanced conventional war and nuclear escalation in the Indo-Pacific. The third analyzes this emerging nuclear future. The fourth presents the team's key findings and recommendations on how the United States can best avoid this future.

Findings Summary

The study suggests that a hypothetical, protracted U.S.-PRC conflict creates conditions wherein nonstrategic nuclear weapons use is both appealing for the PRC and difficult to manage for the United States.²³ In stark contrast to the nuclear escalation pathways of the Cold War, this study also argues that once nuclear escalation in the Indo-Pacific occurs, reciprocal tactical nuclear exchanges may continue in a manner with significantly reduced escalation pressures. The study also defines a region of heightened escalation risk, the “conventional-nuclear crossfade,” where nuclear use is potentially less risky than conventional operations. These core findings reflect the fundamental differences of deterrence in the emerging Indo-Pacific era where differences in geography, targets, and capabilities make limited nuclear escalation potentially more tolerable than in the Cold War era.

The authors found that the United States is currently ill-equipped in its concepts and capabilities to manage escalation risks in the emerging Indo-Pacific era. Relying primarily on submarines and dual-capable fighters and bombers, Blue players repeatedly encountered signaling and

employment challenges due to issues such as platform vulnerability, signaling visibility, and conventional war-fighting requirements. Additionally, Blue players found that a lack of nuclear antiship capabilities dramatically curtailed response options to coercive nuclear employment in the Indo-Pacific.

The TTXs further highlighted that significant differences of opinion are likely to persist among U.S. decision-makers on appropriate responses to Chinese nuclear coercion. The TTXs demonstrate that senior U.S. decision-makers are unlikely to be uniform in their assessment that a nuclear fight over Taiwan merits a U.S. nuclear response. Even after Red nuclear escalation, multiple Blue players voiced their view that U.S. interests in Taiwan were not worth the risk of an in-kind response. Meanwhile, Red players consistently “priced in” Blue responses into their actions and showed a greater tolerance for operational risk-taking given a set of strategic conditions. These differences indicate that PRC nuclear escalation would likely create significant political decision-making challenges for the United States.

The TTXs also illuminated a critical area for future study: the role of allies and partners within a broader U.S. escalation management strategy. Red decision-making underscored the strategic logic of nuclear coercion against U.S. allies and partners. Blue's need to maintain alliance cohesion and the credibility of its extended deterrence guarantees represents a potential vulnerability, particularly when Red faced a disadvantageous conventional balance. Though the impact of

The United States is currently ill-equipped in its concepts and capabilities to manage escalation risks in the emerging Indo-Pacific era.

nuclear weapons use on allies' and partners' territory remains difficult to capture, Blue and Red viewed nuclear strikes on U.S. allies as key strategic turning points, with collective resolve to remain in the conflict resting on domestic

political responses across the alliance. It is crucial, then, to examine what measures are required to strengthen extended deterrence and improve escalation management coordination in the Indo-Pacific.

Methodology

This section has two elements. The first reviews the approach the research team used to interrogate the study's core questions. The second develops a novel model of escalation that reveals the inherent dangers in the intersection between advanced conventional warfare and nonstrategic nuclear employment. In many ways, this model serves as the theoretical underpinning for the TTXs and associated nuclear logics.

Research Approach

The core of the research approach was two strategic TTXs, developed and conducted by the study authors, that aimed to test the United States' ability to withstand and respond to nuclear coercion by the PRC. Building on the CNAS Defense Program's *Avoiding the Brink* study, which tested the risks of nuclear escalation early on in hypothetical 2027 and 2032 conflicts, and its *Dangerous Straits* and *Bad Blood* TTXs, which explored the conventional conflict in the same time epochs, this report's TTXs posited a protracted 2032 conflict, with the exercise beginning on day 45 of a war with China.²⁴ Rather than test the potential for nuclear escalation, these games sought to examine the United States' ability to manage nuclear coercion and escalation once it occurred.

A central part of developing these TTXs was the creation of two hypothetical nuclear employment logics that attempt to achieve conflict termination through theater nuclear weapons use. Neither logic is a perfect representation of reality. Rather, they capture key dynamics associated with nuclear employment and build on a foundational understanding of the challenging conditions of protracted war. While one side may perceive a marginal advantage at a given point in time, transforming this advantage into strategic victory is a fraught and costly proposition.

The first logic, "Spike the Ball," contends that an actor, in this case the PRC, could use theater nuclear arms when marginally advantaged to achieve conflict termination on favorable terms and a shorter timeline. Leadership could make this choice if they viewed the long-term costs associated with concluding the conflict through conventional means as difficult to bear. For those who find such a logic unbelievable, it is important to remember the unpalatable fact the United States pursued such a course of action at the end of World War II when it faced the prospect of a grueling conventional invasion of the Japanese home islands.²⁵

The second logic, "Cold Stop," contends that an actor (again, in this case, the PRC) could use theater nuclear arms when marginally disadvantaged to achieve favorable conflict termination. This logic has a higher degree of innate plausibility, as it aligns with existing views on nuclear weapons as the ultimate guarantors of regime survival. While leadership under these conditions is not concerned with immediate defeat or regime survivability, it could view such a strategy as the best way of avoiding mounting long-term costs and risks.

The two games were designed as mirror scenarios modifying one variable—the side holding the relative advantage—to explore these logics. The games were also named for the logic they explored. In both games, the conflict entered a protracted state and the belligerents confronted considerable military, economic, and political costs. The United States and the PRC faced major shortfalls in conventional precision munitions stockpiles, heavy attrition of air and naval forces, and significant damage to key bases. In the first game, *Spike the Ball*, the PRC maintained a relative advantage over the United States, with the PLA dominating airspace over the strait and gradually expanding its established lodgment on Taiwan. In the second game, *Cold Stop*, the PRC was marginally disadvantaged, with U.S. air and naval intervention stifling cross-strait operations and inhibiting expansion of the lodgment.

The authors scripted nonstrategic nuclear escalation by the PRC as the final element of both games' initial move. Setting the stage for this escalation, both games opened with the PRC revoking its no-first-use policy. Red players were briefed so they could tailor the rest of their first move around eventual limited nuclear use. Red's scripted nuclear strike consisted of seven detonations of notional low-yield warheads intended to have both immediate operational impacts and coercive cognitive-strategic effects. Targets included Guam, Kwajalein Atoll, and a U.S. carrier strike group.²⁶ The combination of low yield and precision created discrete effects that limited both immediate civilian casualties and long-term radiological effects.²⁷

Following this scripted strike, the games moved into traditional free play. The TTXs consisted of two to three adjudicated moves with public and private outbriefs following each move. The Blue team represented high-ranking defense officials on the U.S. National Security Council, and the Red team represented members of the Chinese Central Military Commission. Blue was tasked with stopping the invasion while preventing escalation to general nuclear war. Red was tasked with completing the reunification of Taiwan with mainland China.



Carrier strike groups are a potential theater nuclear target. An attack would limit casualties and infrastructure damage, improve the conventional balance, and destroy an asset with significant prestige value. (Anthony Collier/U.S. Navy)

Participants included subject matter and policy experts from industry, academia, and government. Players varied between the games to eliminate the influence of player learning on the second TTX. Additionally, by introducing new player rosters in each game, the authors were able to contrast different responses to nuclear coercion and identify consistent overlaps in player actions and perceptions.

As part of the preparation for these games, the CNAS team considered how changes in the overarching security environment challenged existing concepts of deterrence and escalation. The team found that much of the thinking of high-end conventional warfare has been dominated by precision strike concepts that have largely ignored the intersection of conventional and nuclear operations. These insights began to germinate during the initial research stages of the report. Designing and executing the TTXs helped to crystalize the team's thinking around the conventional-nuclear crossfade. The following section attempts to outline a framework for integrating high-end conventional warfare and nuclear operations.

The Conventional-Nuclear Crossfade

The core problem when considering conventional-nuclear integration is how to best conceptualize the continuum of conflict, and therefore escalation, from peace at one end of the spectrum to all-out global thermonuclear war at the other. Broadly speaking, most of the implicit mental models for thinking about deterrence and conflict are based on some form of linear progression from one step to the next. Whether or not one subscribes to Herman

Khan's (in)famous 44-step escalation ladder, its impact is undeniable.²⁸ Yet, it is a flawed tool in today's age given the realities of advanced conventional warfighting, a style of warfare that stresses precision, speed, and multi-domain effects to quickly cripple an adversary.

Advanced conventional warfare dramatically expands the "crossfade" domain wherein conventional strikes may have a greater risk of triggering general nuclear war than nuclear strikes. Simultaneously, it impacts theater nuclear weapons by dramatically enhancing precision and helping to constrain their negative effects.

When the technologies and

approaches of advanced conventional warfare are applied to low-yield, nonstrategic nuclear weapons, they expand the crossfade domain in the other direction, wherein nuclear strikes may have fewer risks than conventional ones. In other words, the line between low-yield tactical nuclear weapons and precision-guided conventional weapons in terms of both their operational effects and perceived impact is blurring. This area is ripe for misperception and miscalculation.

Why is advanced conventional warfare different from past approaches and so caustic to existing deterrence and escalation concepts? Simply, it can combine effects from multiple domains to immediately, directly, and efficiently strike at key adversary command, logistics, and industrial nodes from the conflict outset.²⁹ It does this with a precision and speed that the prior warfighting regime, characterized by an attritional nature and industrial scale, could not. From an escalation perspective, bypassing frontline adversary forces to strike directly at the key elements of military and even national power is inherently escalatory. In advanced conventional warfare, however, it is the path to victory.

In a limited war between peer states with advanced conventional warfighting capabilities and nuclear arms, any crisis or conflict is particularly dangerous. Beyond the factors highlighted here, various beliefs and perceptions of the comparative value of different targets and modes of attack, whether conventional or nuclear, dramatically heighten the risk of miscalculation and general nuclear conflict. For example, would a nuclear antiship attack well out to sea be more escalatory than

a disarming, preemptive counterforce attack against strategic nuclear forces conducted solely with conventional arms?³⁰ While this is an extreme example, it does highlight the dangers associated with the highest levels of advanced conventional warfighting. This danger is particularly acute given the emphasis placed on early attacks against command, control, communications, and sensing capabilities by the dominant conventional warfighting approaches. These capabilities often support both conventional and nuclear missions, creating significant escalation risk.³¹

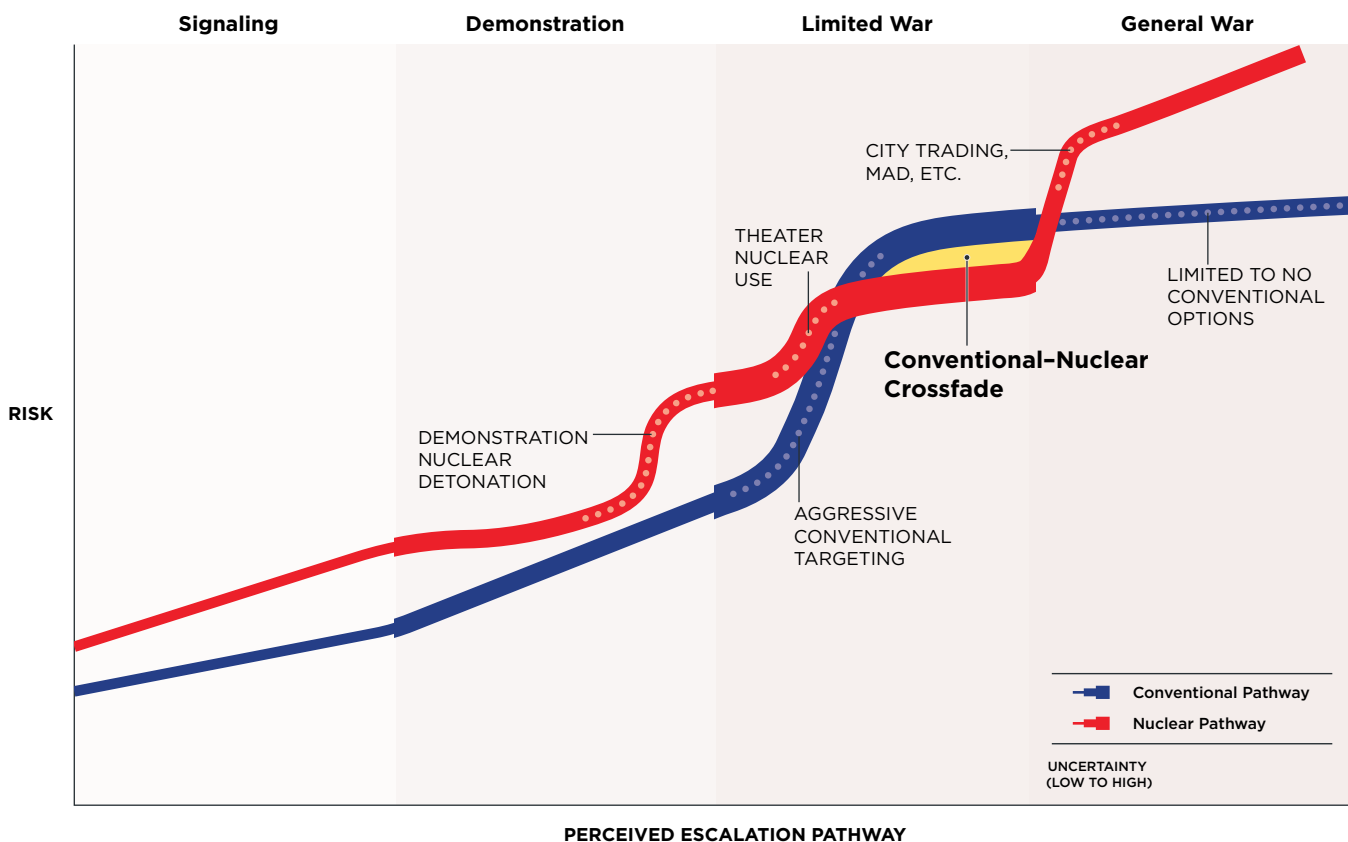
Furthermore, it is increasingly apparent that multiple escalation pathways coexist, since unconventional, conventional, and nuclear actions can occur simultaneously in pursuit of state objectives.³² New domains such as space and cyber help to further reveal the weaknesses of any escalation model with a singular path. At different points in a crisis or conflict, the area of absolute greatest risk can shift as states employ various tools and make unique choices.

The conventional-nuclear crossfade region is one such area of transition and is outlined in Figure 1. The escalation curves on this chart are representative: the magnitude of specific pathways is conflict dependent and

cannot be plotted with precision. The graphic shows the notional perceived risks associated with two escalation pathways, nuclear and conventional. As an actor moves to the next step on its respective path, the risks change, potentially in a nonlinear and unexpected manner. The region of greatest concern is the golden area shown in the graphic below, where the risks associated with conventional and nuclear options cross and become unclear. This is the crossfade, the region where advanced conventional warfighting approaches allow one side to create effects above and beyond the traditional roles associated with nonstrategic nuclear arms. The crossfade is an expanded region of highly intense and unstable yet limited conflict under the seeming certainty of strategic stability.

Ultimately, the crossfade emphasizes that escalation is not a neat march from conventional military options to limited nuclear use and then general nuclear war. While it is easier to identify the limits of the escalation domain, the crossfade between conventional and nuclear arms is a miasma of uncertainty rife with risks of misperception and failed gambles. When considering the future of high-intensity warfare between peer states, understanding the dangers of the crossfade is imperative to avoiding them.

FIGURE 1: THE CONVENTIONAL-NUCLEAR CROSSFADE IN THE INDO-PACIFIC THEATER



Analysis

Over the course of this research project, the authors reached several disquieting conclusions. The team continued to see the negative impacts of the “Cold War hangover” on strategic planning in the United States. Patterns of thought, approaches, models, and concepts are largely tied to U.S.-Soviet competition. The view that Cold War deterrence approaches represent an immutable form of deterrence is increasingly called into question by changing technology, evolving operational concepts, differing strategic cultures, and shifting competitive geographies.

Broadly speaking, the emerging nuclear dynamics between the United States and China appear to have different dynamics than those between the United States and the Soviet Union and carry a greater risk of limited nuclear use. The lack of a relatively shared understanding of nuclear weapons and regularized contact are major issues of concern.³³ More fundamentally, changes in geography and technology from the Cold War era to the Indo-Pacific era define a set of potential use cases that appear politically coercive and operationally advantageous.

This analysis is broken up into three sections. The first examines the general nature of nuclear arms and deterrence in the Indo-Pacific era. The second explores the implications specific to the United States. The third explores a smaller number of potential insights into PRC behavior.

Nuclear Arms in the Indo-Pacific Era

The emerging nuclear dynamic in the Indo-Pacific is a paradox. There are several factors that encourage the use of nonstrategic nuclear weapons, but other factors restrain further escalation. The net effect is that there is an increased probability of a limited nuclear conflict that is unlikely to transition to general nuclear war. Additionally, the effects of nuclear use on key domestic and international constituencies is the wild card that could tip the balance one way or the other.

FACTORS THAT ENCOURAGE NONSTRATEGIC NUCLEAR USE

There are three factors that seem likely to encourage nonstrategic nuclear use. Each is rooted in the character of a protracted U.S.-PRC conflict and shows that this specific conflict character ultimately shapes how states consider employing nonstrategic nuclear weapons. Furthermore, these factors are indicative of the conventional-nuclear crossfade, as states seek to appropriately manipulate risk in search of strategic objectives.

The archipelagic and maritime nature of potential conflict in the Indo-Pacific era could increase the attractiveness of limited nuclear strikes. During the Cold War, theater nuclear weapons were envisioned to destroy large numbers of distributed ground forces. This carried significant escalation risks due to the large numbers of weapons required and the resulting significant impacts on civilian populations and infrastructure.³⁴ Today in the Pacific, naval vessels at sea and military airbases on small islands are a vastly different target set in both quantity and kind. The combination of precision, low-yield weapons and target discrimination means that a belligerent could use a few weapons with confidence that they will hit their targets with relatively little collateral damage. This calculation decreases the overall fears of escalation and increases the potential for use.

Target selection allows for theater nuclear use to remain a “war of the battlefield,” albeit a war with coercive characteristics rather than a war of pure risk and coercion.³⁵ A focus on conventionally relevant targets means that even if a state does not achieve termination, a state can gain a potentially decisive conventional advantage through limited nuclear escalation. In the Indo-Pacific era, asymmetric nuclear coercion is the pacing challenge for U.S. intrawar deterrence and conventional nuclear integration concepts.

Furthermore, theater nuclear weapons have an increased operational utility when a conflict protracts. Protraction is characterized in part by significant reductions in preferred conventional munitions. This increases the perceived utility of nuclear arms, which are highly efficient at creating both immediate damage and lasting effects. Repeated conventional strikes with ballistic weapons against, for example, airfields, is a viable strategy when the quiver is full. However, this suppression “tax” is likely to become unbearable as the magazine becomes depleted. On a per-weapon basis, nuclear arms are more efficient at destroying large-area targets and complicating target reconstitution.³⁶ Causing lasting, large-scale damage to large-area targets, such as airbases, is particularly important in a protracted war.

In addition, nuclear arms do not require the same degree of precision as conventional weapons to achieve their operational effects. This can further increase the attractiveness of nuclear arms when command, control, communications, and intelligence capabilities and networks have been significantly degraded after weeks of kinetic and non-kinetic attacks.³⁷ Across the TTXs, both teams recognized this value, albeit at different periods of the conflict. However, a recognition of their operational value did not necessarily translate into a decision to employ.

In international relations literature, the concept of “gambling for resurrection” refers to a phenomenon where leaders will continue a losing conflict that could end in their fall from power in the hope of a late miracle.

*Ultimately, theater nuclear use in pursuit of termination—whether marginally advantaged or disadvantaged—has an uncomfortable yet plausible logic. Conducting such operations when marginally disadvantaged has an innate degree of plausibility as a way to compensate for conventional shortcomings. Conversely, players in the *Spike the Ball* TTX, where Red employed theater nuclear weapons from a position of advantage, also came to understand the logic for war control and termination. This understanding was based on leadership desires to avoid the costs and risks associated with conventional conflict termination.*

In international relations literature, the concept of “gambling for resurrection” refers to a phenomenon where leaders will continue a losing conflict that could end in their fall from power in the hope of a late miracle.³⁸ Both nuclear-use logics postulated by this study represent a similar concept: gambling for termination. Any nuclear use is an inherent gamble, as is fighting a long, conventional conflict against a peer competitor. From positions of marginal advantage or disadvantage, it can be challenging to understand the conflict’s endgame with any certainty. This lack of certainty may drive a leader to take this gamble.

FACTORS THAT KEEP THE CONFLICT LIMITED DESPITE NONSTRATEGIC NUCLEAR USE

While the prior three factors may encourage the use of nonstrategic nuclear arms, the next two factors appear to keep the conflict limited. This tension between expansion and constraint is not new, as it lies at the heart of the stability-instability paradox—but the tension creates dynamism and uncertainty.

Red lines drawn within the nuclear bargaining domain are continually revised, with protraction creating more time for such revisions to occur. Limits on combat operations, whether tacitly agreed upon by both sides or explicitly stated, are revised as the conflict progresses.³⁹ This bargaining process has been well studied by scholars for decades.⁴⁰ As previously mentioned,

these TTXs suggest that the use of nuclear arms is not the ultimate limit leading directly to a general nuclear exchange and that coercive nuclear bargaining can occur at relatively low levels of absolute damage and casualties.⁴¹ There are two additional observations worth highlighting. First, the potential for significant casualties and losses in a protracted conventional conflict makes the revision of red lines more likely as belligerents search for sustained military advantages. Second, it is unclear what would transition a conflict to general nuclear war. It appears that this transition requires a significant shock that compels leadership to take this major step, and strategic deterrence of large-scale nuclear attacks seems robust. During the TTXs, all sides were influenced by the stability-instability paradox as they consciously tried to avoid crossing the boundary to general nuclear war. These TTXs suggest an expanded bargaining domain below the level of general nuclear war while reinforcing the continued salience of the strategic nuclear cliff.⁴²

Despite continuous bargaining over acceptable forms of combat and targets, violating the nuclear taboo does not appear to license additional uses, as each subsequent use carries with it unique risks. Violating the nuclear taboo and employing the first nuclear weapon in combat since 1945 would be a monumental decision.⁴³ While crossing this line likely does not trigger immediate “escalator” escalation, additional uses carry with them their own, largely independent risks.⁴⁴ As both sides seek to avoid general nuclear war, tit-for-tat behaviors that tacitly or explicitly acknowledge these independent risks appear the most likely pathway for a limited exchange.

THE WILD CARD

Predicting the future is a difficult business. Leadership decisions are shaped by a complex array of factors that are often difficult to account for. This analysis has identified a significant wild card that will play a major role in what transpires on the day after nuclear weapons use: domestic and international political reactions.

The political ramifications of nonstrategic nuclear use are highly variable and unpredictable. While there is a clear operational utility to nuclear arms, their political impacts are far less certain, resulting in a wide range of different beliefs within the expert community. In the TTXs, differing views drove different Blue responses. The Blue team that anticipated declining domestic and international support did not respond proportionally, while the Blue team that felt that domestic and international audiences would demand retribution engaged in tit-for-tat responses. The reaction of domestic political audiences is likely the key variable shaping

the response of any democratic nation. This domestic political reaction is very difficult to explore via gaming and remains the fundamental, unknowable component of asymmetric nuclear coercion. For the United States, an additional and largely unexplored component is alliance management. Given the criticality of U.S. allies to operations in the Indo-Pacific, it stands to reason that they are a likely target for PRC coercion. Understanding alliance reaction to direct or indirect PRC nuclear coercion is a logical next step for this line of research.

The combination of tit-for-tat responses; relative risk acceptance; precise, low-yield weapons; discriminate military targets; and creative targeting can lead to a limited nonstrategic nuclear exchange. While danger is present in any nuclear use or exchange scenario, rapid, uncontrolled escalation did not occur in these TTXs. The avoidance of more escalatory steps such as homeland nuclear strikes, combined with the nature of the theater, is likely responsible for these escalation constraints. The wild card here—a different set of domestic or international political reactions and their resulting pressures on leaders on both sides—could lead to a very different set of outcomes.

Implications for the United States

The shift in thinking required to adjust to the nuclear realities of the Indo-Pacific era holds specific implications for the United States beyond the previously discussed general impacts. Capturing these implications is crucial to changing U.S. policy, doctrine, and capabilities to best address the deterrence and warfighting needs of this new age. Overall, the United States is ill-prepared to confront the challenges of this era, especially with regard to theater nuclear use and deterring asymmetric nuclear coercion.

The United States is likely to encounter significant differences of opinion on the appropriate way to respond to any PRC nuclear coercion whether through retrenchment, signaling, or use. Across the two TTXs, Blue players responded very differently to Red's nuclear coercion. While the TTX rules of engagement did not permit capitulation, some Blue players noted their belief that the stakes of a Taiwan conflict were not worth the risks of nuclear retaliation even if Blue risked undermining its other extended deterrence commitments. For those Blue players who argued for continuation, there was a broad range of divergent opinions on the best course of action. These opinions included staying the course, very limited demonstrations of conventional counterforce, a targeted campaign of conventional punishment, aggressive nuclear signaling operations, and various

tit-for-tat nuclear employment responses. Blue responses in both games represented a balance between different viewpoints, each with a specific risk tolerance. These differences of opinion are likely a fair approximation of the political challenges that U.S. leadership would confront should this future unfold.

The United States is also likely to struggle to generate coercive leverage or develop effective counter-coercion approaches against the PRC due to risk avoidance and a lack of understanding of PRC leadership perceptions. In the TTXs, Red had a strong set of beliefs about the potential costs of their actions prior to undertaking them and had “priced in” Blue responses. Blue largely conformed to Red's prior beliefs and consequently found it difficult to coerce or deter Red. Applying this lesson from the TTXs to real-world interactions, the PRC has developed a deep understanding of U.S. behavior and the American “way of war.”⁴⁵ Predictable and often risk avoidant, U.S. choices allow for adversaries to remain one step ahead. Furthermore, a lack of understanding of PRC leadership motivations, valuations, and vulnerabilities can create decision paralysis among U.S. leaders. The PRC's demonstrated unwillingness to communicate transparently and consistently about its intent and capabilities—combined with a stylized, shallow, and ultimately poor conception of the PRC among many in the United States—creates fertile ground for poor decision-making by U.S. leadership in crisis and conflict.

Furthermore, the asymmetry of targets—meaning the lack of “good” options for the United States compared to those facing the PRC—constrains potential U.S. responses. This finding was first identified in *Avoiding the Brink*, which concluded:

The United States' force posture is distributed across the sea, allied territory, noncontiguous U.S. territories, noncontiguous states, and the continental United States; outside of the invasion force, most of China's most important military targets are located on the Chinese mainland. This fundamental asymmetry provides China with more graduated options than the United States to strike important military targets while avoiding the U.S. homeland.⁴⁶

This study comes to the same conclusion. In these TTXs, Blue struggled to find viable “middle ground” targets against which to employ theater nuclear capabilities: targets that were simultaneously militarily useful and politically significant but did not risk general nuclear war. When a very small number of such targets were

identified, Blue players felt they lacked the systems to strike them effectively.

Ultimately, the United States lacks effective conventional and nuclear capabilities and supporting concepts for responding to nuclear coercion should deterrence fail. In a protracted conflict, the United States will face a dearth of conventional options for responding to asymmetric theater nuclear use. Most of the high-end conventional capabilities that are often discussed as “non-nuclear strategic weapons” will have been used up in the early days of the conflict.⁴⁷ When considering nuclear responses, the United States lacks the requisite tools. From an employment perspective, Blue lacked a nuclear-tipped antiship capability. Given the maritime nature of the theater, such a capability is likely a major gap for the United States.

Turning to sea-based capabilities, it is highly unlikely that the United States would be willing to accept the vulnerability associated with a submarine port call during such a conflict. Furthermore, nuclear-armed sea-launched cruise missiles (SLCM-N) on U.S. attack submarines cannot be easily used as a signaling tool given conventional operational requirements and the risks associated with unmasking such an asset. The low-yield Trident II submarine-launched ballistic missile (SLBM) has similar signaling challenges and is deployed on a platform that U.S. leaders would be even less willing to unmask than an attack submarine given its role in strategic deterrence.

In the TTXs, Blue’s signaling strategy thus relied heavily on rhetoric and proportional response, both of which Red perceived as acceptable costs. The logic of deterrence leads to actions and statements that lack clarity and are rife for misperception. Blue’s approaches showed this reality.

Understanding Potential PRC Pathways

While this study was primarily concerned with understanding how the United States could best withstand asymmetric nuclear coercion, it resulted in several observations on how the PRC may behave in a nuclear crisis. These observations reflect a PRC that has an expanded nuclear arsenal, an increased array of theater capabilities, and a risk-acceptant behavior in crisis and conflict.



Using ballistic missile submarines for theater nuclear operations creates substantial risks, given their essential role in strategic deterrence. The TTXs conducted for this project highlighted numerous signaling difficulties the United States is likely to encounter in an escalation management scenario. (Devin M. Langer/U.S. Navy)

The PRC could view potential U.S. emphasis on proportionality as conducive to its theory of victory, especially in a nuclear scenario. This is directly related to Blue’s struggle to generate coercive impacts due to the “priced-in” nature of its actions. In one TTX iteration, Blue’s tit-for-tat nuclear response gave the Red team the impression that it remained “in the driver’s seat.” These behaviors suggest that the PRC could understand and plan for the most likely set of U.S. responses. Furthermore, proportionality may bolster a perception by PRC leadership that the “long game” favors its interests and approaches, especially in any form of sustained theater exchange.

The PRC likely views U.S. alliance commitments as a potential point of coercive leverage, and therefore as a double-edged sword for the United States. While U.S. regional allies create challenges for the PRC, they also represent a commitment challenge for the United States. In both TTXs, Blue needed to maintain alliance cohesion to support access to bases across the region. Additionally, Blue teams contended with how to assure allies and maintain the credibility of extended deterrence commitments following Red’s nuclear use. Limited nuclear targeting appears to align with a potential PRC theory of victory for protracted conflicts which would depend on sapping the U.S. alliance network of its political resolve and outlasting its direct military strength. Red decision-making from both TTXs underscored the strategic logic of expanding nuclear coercion to U.S. allies and partners. This is a crucial area for future study.

Key Findings and Recommendations

This study describes a dangerous future. The key findings and recommendations stress the need to improve U.S. nuclear fluency and competency among operational commanders and senior political leaders. Following the end of the Cold War, the nuclear community was increasingly siloed off from wider defense policy circles. The realities of the Indo-Pacific era stress the need to make conventional-nuclear integration more than a shibboleth. Achieving effective intrawar deterrence necessitates difficult conversations, pragmatic planning, and, potentially, the development of new nuclear systems.

FINDING

Protracted conventional conflict with the PRC heightens the potential for nonstrategic nuclear use due to decreasing conventional capabilities, increasing nuclear signaling and use options, and the nature of the theater. The archipelagic and maritime nature of conflict in the Indo-Pacific age stands in stark contrast to the Cold War confrontation in central Europe. Theater nuclear use concepts involving 10 or fewer air-burst weapons are much different than concepts requiring hundreds of weapons. Furthermore, protraction is characterized by significant reductions in preferred munitions, which increases the perceived utility of nuclear arms due to their efficiency in creating both immediate damage and lasting effects.

RECOMMENDATIONS

- *Educate senior U.S. decision-makers on the troubling logic of theater nuclear use and corresponding limits on U.S. responses.* In the United States, senior decision-makers must look beyond the PRC's longstanding declaratory policy on nuclear weapons as its evolving arsenal creates opportunities for rapid shifts in its nuclear strategy. Minimally, U.S. leadership must understand the dangerous branches of China's uncertain nuclear future and the current limitations on possible U.S. responses. This reckoning must also involve an evolution from Cold War-era deterrence logic at the nonstrategic levels to incorporate massive advances in conventional strike capability. For these reasons, the National Security Council, the Department of Defense, the Department of Energy, and the Intelligence Community should

jointly commission a high-level, outside study group to consider the questions of deterrence evolution, advanced conventional warfighting, theater nuclear use, and U.S.-PRC nuclear dynamics. It should comprise a primarily younger cadre of experts reinforced by a select group of senior advisors to avoid negative learning from the past age of nuclear competition. Beyond delivering a series of reports, the team should work toward building a set of experiential exercises for the senior-most U.S. decision-makers to present them with the pernicious and unsettling challenges posed by this future. Ideally, this study group and its outputs would help chart a path away from this precipice.

- *Pursue dialogue and confidence-building measures where possible with the PRC, even when there is a perception of limited movement.* Arguably the most pressing issue in the U.S.-PRC strategic relationship is a lack of understanding between both sides. Concerningly, many believe that the PRC finds this to be an advantageous position. Simultaneously, existing Track 1, 1.5, and 2 dialogues have remained largely frozen since the outbreak of COVID-19 in early 2020. The United States and its allies should continue to engage with PRC interlocutors on whatever basis is possible in an attempt to create pathways for dialogue and understanding. By presenting concerns around emerging warfare regimes and new technologies, the United States may be able to generate meaningful conversations about sensitive, nuclear-adjacent issues. Engaging in confidence-building measures surrounding advanced conventional warfighting and conventional-nuclear integration may be a more tenable—and also urgently needed—avenue for engagement.

FINDING

U.S. regional allies are a clear strength and potential vulnerability, especially given U.S. extended deterrence commitments. The United States has repeatedly emphasized the importance of its alliance structure in maintaining a “free and open Indo-Pacific.” It stands to reason that this centrality would make it a natural target for the PRC. The PRC may use nuclear arms to undermine or outright break U.S. extended deterrence commitments and therefore the underlying alliance. Ongoing debates about the U.S. role in the world and the deep differences in opinion on response options revealed in the TTXs only underscore why the PRC may find such an approach fruitful.

RECOMMENDATION

- *Hold detailed planning conversations with Japan and Australia on responses to nuclear use.* Because of their key role, U.S. regional allies are highly plausible targets for limited nuclear coercion by China. U.S. diplomats and senior military officials at USINDOPACOM and U.S. Forces Japan must begin forthright discussions on the implications of PRC nuclear expansion and U.S. extended deterrence commitments. These conversations must cover resilience and redundancy, including an emphasis on forces operating in and around nuclear contamination. As with the integration of nuclear considerations into U.S. planning, similar efforts with key regional allies can limit the potential coercive advantage the PRC could gain in pursuing such a strategy and ultimately enhance deterrence. Eventually, the United States should consider expanding these discussion—but beginning with two long-standing and vital allies represents a phased approach to a sensitive topic.

FINDING

The United States lacks the doctrine, capabilities, and concepts to manage the conventional-nuclear crossfade, whether through signaling, conventional responses, or nuclear use. U.S. nuclear thinking and systems are tied to the European theater and the Cold War. Current U.S. approaches to nonstrategic nuclear weapons have focused either on the modernization of legacy systems or the relatively quick development of derivative capabilities in response to perceived changes in Russian capabilities and doctrine. These capabilities lack a clear signaling logic and face employment challenges, primarily due to the impact of conventional conflict on delivery platform availability. Furthermore, these nuclear capabilities do not consider conventional drivers for nuclear use in a protracted conflict.

RECOMMENDATIONS

- *Fully integrate nuclear activities into U.S. planning and exercises, not just as a “last day” or stand-alone event.* There is a clear need to achieve full conventional-nuclear integration in planning and response activities, not simply as an “add-on” to existing exercises. In addition, the United States’ ability to credibly operate and fight through nuclear weapons use will bear heavily on deterrence. By holistically integrating nuclear operations into conventional exercises, the U.S. military can restore what was once a core competency: operating in a nuclear environment. Reviving

this skill for great power competition and potential U.S.-PRC conflict would generate a powerful signal that U.S. forces are alert to the threat of nuclear escalation and lessen the operational advantages that an adversary may seek to gain through theater nuclear use. This should include joint command post exercises between USINDOPACOM and USSTRATCOM to ensure roles and responsibilities are properly understood and nuclear fluency is suffused throughout USINDOPACOM planning offices. Further, the Joint Staff and the Office of the Secretary of Defense need to review existing war plans and the overarching Unified Command Plan to ensure that roles and responsibilities in the conventional-nuclear crossfade region are properly codified and delineated.

- *Develop and exercise operational concepts for visible theater nuclear generation.* The United States’ standard playbook for visible generation of and signaling with nuclear forces relies heavily on dual-capable fighter and bomber aircraft. Recently, ballistic missile submarines have also been used for signaling operations. While each of these options has limitations that are amplified during a conflict scenario, making them unlikely to be used, Air Force dual-capable fighter and bomber aircraft are likely the best option for visible signaling operations. Given the challenges associated with permanently stationing nuclear weapons in theater, the Air Force must develop the tactics, techniques, and procedures to move nonstrategic nuclear weapons quickly and safely to theater and mate with forward-deployed aircraft. At first, such concepts should focus on deployments to the noncontiguous United States, with later evolutions including U.S. allies, if willing. The Pacific Air Forces should, as an initial step, rehearse the movement of such weapons from the continental United States to forward operating locations in Alaska, Hawaii, and Guam. These rehearsals should occur as a subset of ongoing Bomber Task Force signaling operations conducted by Air Force Global Strike Command.
- *Improve both the capabilities and capacities of conventional munitions.* In a protracted conflict, the United States will run low on its preferred conventional munitions inventory, dramatically curtailing U.S. ability to continue to pursue its military objectives through conventional means. Further, this depletion of advanced conventional capabilities means that the United States may find itself unable to respond to nuclear escalation through aggressive conventional

measures, increasing the chances that the United States would need to respond in kind with nuclear weapons. Moreover, nuclear arms have an innate efficiency in a purely military context: a single weapon can destroy a large area target. In a protracted conflict, this efficiency may prove to be an operationally enticing proposition. To avoid relying on theater nuclear arms, the U.S. joint force must expand conventional munitions capabilities to include the creation of area-effects weapons, development of “good enough” weapons that can be produced en masse, and funding of enhanced production capacity for all classes of preferred munitions. This includes submunition warhead options for existing cruise and ballistic weapons and a new family of short-range unitary and submunition weapons specifically tailored for survivable strike platforms with Joint Direct Attack Munition (JDAM)-like economics. These conventional enhancements not only enable the United States to sustain its conventional operations but also allow it to better manage nuclear escalation by expanding the conventional options available to U.S. commanders.

- *Consider expanded theater nuclear weapons capabilities.* To avoid a general nuclear war, U.S. leaders may need to create substantial escalatory pressures to manage the conflict. The intraconflict bargaining domain is unsettling at the best of times. Given the asymmetry of targets, the United States likely lacks the necessary theater nuclear capabilities to engage in effective

conflict management to forestall successful nuclear coercion. For this reason, the United States should consider the development of a small number of nuclear antiship capabilities. This would increase the flexibility of U.S. theater nuclear capabilities and better align legacy Cold War capabilities with the Indo-Pacific age. The authors acknowledge that such a step would pose significant international, domestic, and technical challenges. For these reasons, any such development program should be designed to create a “break in case of emergency” capability that could be fielded in very small numbers (less than 20 total weapons) on relatively short notice if compelled by clear changes in adversary nuclear strategy. Such a weapons development activity should make best use of ongoing work on both conventional antiship capabilities such as the Long-Range Anti-Ship Missile (LRASM) and Maritime Strike Tomahawk as well as the W80-4 warhead modernization. This approach should enable rapid fielding while limiting development challenges.

Any study on emerging nuclear dynamics in today’s world is likely to be disquieting. This effort is no different. The authors want to reiterate that this world does not yet exist and may not come to pass. However, it must be actively deterred. Doing so requires proactive steps by the United States, continued engagement with the PRC, and ultimately, an increased acceptance of risk by U.S. leadership commensurate with the challenges of deterrence at the strategic and theater levels.

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11. *Military and Security Developments 2023*, 66–67.
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19. Andrew Metrick, *Rolling the Iron Dice: The Increasing Chance of Conflict Protraction* (Washington, DC: Center for a New American Security, 2023), 19, https://s3.us-east-1.amazonaws.com/files.cnas.org/documents/IronDice-ProtractedWar_Final_110723.pdf.
20. The logic of asymmetric nuclear escalation is best described by Vipin Narang in *Nuclear Strategy in the Modern Era*. However, for the purposes of this study, asymmetric escalation is seen as a nuclear posture that is latently embedded within states with both an advanced conventional warfighting capability and an assured nuclear retaliation capability. The technological and operational foundations of these capabilities are highly synergistic. For more on nuclear posture and asymmetric escalation, see: Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014).
21. It should be noted that there is no good definition of a protracted conflict. This work accepts the definition in *Rolling the Iron Dice* of a conflict that lasts longer than leadership expects. The authors understand that 40 days into a conflict may not appear protracted, but certainly, large numbers of military capabilities have been exhausted by this point. More practically, from a game design perspective, generating a plausible scenario six months to a year into a high-intensity conflict between two nuclear-armed peer states is analytically fraught. By centering the protracted scenario relatively close to conflict onset, the authors were able to have an increased degree of analytic believability in the scenario, order of battle, and geopolitical state.
22. Narang, *Nuclear Strategy in the Modern Era*, 14–23.
23. For the purposes of this study, the research team uses the terms nonstrategic and theater nuclear arms interchangeably. The team coarsely defines this class of weapons as those with a yield of 20 kilotons or less. This is just below the yield of the weapon used against Nagasaki. See: U.S. Department of Energy, “The Atomic Bombing of Nagasaki,” The Manhattan Project: An Interactive History, <https://www.osti.gov/opennet/manhattan-project-history/Events/1945/nagasaki.htm>; *Military and Security Developments* 2023, 111–112.
24. *Statement for the Record Before the House Select Committee on Competition between the United States and the Chinese Communist Party* (2023) (statement of Stacie Pettyjohn, Becca Wasser, and Andrew Metrick); Stacie Pettyjohn, Becca Wasser, and Chris Dougherty, *Wargaming a Future Conflict over Taiwan* (Washington, DC: Center for a New American Security, 2022), <https://s3.amazonaws.com/files.cnas.org/CNAS+Report-Dangerous+Straits-Defense-Jun+2022-FINAL-print.pdf>; and Pettyjohn and Dennis, *Avoiding the Brink*.
25. Richard Rhodes, *The Making of the Atomic Bomb* (New York: Simon & Schuster, 2012), 697–749.
26. Targets represent locations and assets commonly targeted in a wide range of wargaming work. For more, see: Pettyjohn, Wasser, and Dougherty, *Dangerous Straits*; Chris Dougherty, *More than Half the Battle: Information and Command in a New American Way of War* (Washington, DC: CNAS, 2021), <https://s3.amazonaws.com/files.cnas.org/CNAS+Report-Command+and+Info-2021.pdf>; Mark F. Cancian, Matthew Cancian, and Eric Heginbotham, *The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan* (Washington, DC: Center for Strategic and International Studies, 2023), <https://www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan>; and Eric Heginbotham et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996–2017* (Santa Monica, CA: RAND Corporation, 2015).
27. All of the modeling to coarsely capture nuclear impacts was built on open-source data and tools. All warhead yields used were notional, rough orders of magnitude. For more, see: E. Royce Fletcher et al., *Nuclear Bomb Effects Computer (Including Slide-Rule Design and Curve Fits for Weapons Effects)* (Albuquerque, NM: Lovelace Foundation, 1962), <https://apps.dtic.mil/sti/citations/ADA384998>; Samuel Glasstone and Philip J. Dolan, *The Effects of Nuclear Weapons*, 3rd ed. (Washington, DC: U.S. Department of Defense and U.S. Department of Energy, 1977), <https://www.osti.gov/servlets/purl/6852629>; Alex Wellerstein, *NUKEMAP*, <https://nuclearsecrecy.com/nukemap>; and Jean Bele, *Effects of Nuclear Weapons (Phys 8.S271)* (Cambridge, MA: MIT Laboratory for Nuclear Science, 2021), 24, <https://nuclearweaponsedproj.mit.edu/sites/default/files/documents/Effect%20of%20Nuclear%20Weapons%208.S271%20%281%29.pdf>.
28. Herman Kahn, *On Escalation: Metaphors and Scenarios* (New York: Routledge, 2017).
29. Many have discussed how many of the changes associated with advanced conventional warfighting have led to greater entanglement between conventional and nuclear systems and therefore escalation risks. The argument here is different. It is that the very character of advanced conventional warfare is escalatory. When two peer states who both possess these capabilities go to war, escalation is directly embedded in their concepts for fighting. For more on escalation through entanglement, see: Rebecca

- Hersman, "Wormhole Escalation in the New Nuclear Age," *Texas National Security Review* 3, no. 3 (Summer 2020), <http://dx.doi.org/10.26153/tsw/10220>; James M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security* 43, no. 1 (2018): 56–99, https://doi.org/10.1162/isec_a_00320.
30. Keir A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and Future of Nuclear Deterrence," *International Security* 41, no. 4 (2017): 9–49, https://doi.org/10.1162/ISEC_a_00273.
 31. Rebecca Hersman et al., *Under the Nuclear Shadow: Situational Awareness Technology and Crisis Decisionmaking* (Washington, DC: Center for Strategic and International Studies, 2020), https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200318_UnderNuclearShadow_FullReport_WEB.pdf?VJm_nrx2bVVeByYH38yx8YkDv-vr1QZVW.
 32. In this context, unconventional is a catch-all term referring to a wide array of coercive activities that fall outside of traditional force-on-force military operations. It includes things such as cyberattacks, information operations, gray zone activities, and special operations actions.
 33. David Santoro, "Getting Past No: Developing a Nuclear Arms Control Relationship with China," *Journal for Peace and Nuclear Disarmament* 6, no. 1 (2023), <https://doi.org/10.1080/25751654.2023.2221830>; Tong Zhao, "Underlying Challenges and Near-Term Opportunities for Engaging China," *Arms Control Today* 54 (January/February 2024), <https://www.armscontrol.org/act/2024-01/features/underlying-challenges-near-term-opportunities-engaging-china>.
 34. For an example of the potential scale of tactical nuclear use in a war between NATO and the Warsaw Pact, see: James A. Blackwell, *Cognitive Hyper Dissonance: Nuclear Signaling Through Military Exercises* (Alexandria, VA: Institute for Defense Analysis, 2020), 21–25, <https://www.ida.org/-/media/feature/publications/c/co/cognitive-hyper-dissonance-nuclear-signaling-through-military-exercises/p-11014.ashx>.
 35. This observation both draws on Schelling's ideas in "The Idiom of Military Action," while arguing for a degree of distinction in theater (or tactical) nuclear use that runs counter to his claims. The core argument of this study is that changes in the nature of nonstrategic nuclear arms and the differences in the geographic theater have created more of a distinction between theater and strategic weapons than existed during the Cold War. See: Schelling, *Arms and Influence*, 126–189.
 36. James R. McCue, Adam Lowther, and James Davis, "A Tactical Nuclear Mindset: Deterring Conventional Apples with Nuclear Oranges," *Aether: A Journal of Strategic Airpower and Spacepower* 2, no. 2 (2023): 10–12, https://www.airuniversity.af.edu/Portals/10/AEtherJournal/Journals/Volume-2_Number-2/McCue.pdf.
 37. Dougherty, *More than Half the Battle*.
 38. George W. Downs and David M. Rocke, "Conflict, Agency, and Gambling for Resurrection: The Principal-Agent Problem Goes to War," *American Journal of Political Science* 38, no. 2 (1994), <https://www.jstor.org/stable/2111408>.
 39. For example, Ukraine has conducted deep strikes inside of Russia, including against key airbases that support their nuclear deterrent and on Moscow. These operations would have been unthinkable at the outset of the conflict. For more on Ukraine, see: Susie Blann and Dasha Litvinova, "Ukrainian Drones Strike Deep in Russian Territory, Moscow Says, While a Barrage in Kyiv Kills 2," Associated Press, August 30, 2023, <https://apnews.com/article/russia-ukraine-war-drones-a9fc4ddad80a906e85aac-ca7354eb317>; Veronika Melkozerova, "Drone Attack Hits Russia's Engels Airbase for Second Time in a Month," *POLITICO*, December 26, 2022, <https://www.politico.eu/article/russia-ukraine-war-vladimir-putin-drone-attack-hits-russias-engels-airbase-for-second-time-in-a-month>.
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 43. Nina Tannenwald, "The Nuclear Taboo: The United States and the Normative Basis of Nuclear Non-Use," *International Organization* 53, No. 3 (Summer 1999), <https://www.jstor.org/stable/2601286>.
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 46. Pettyjohn and Dennis, *Avoiding the Brink*, 2.
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PRINTER

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Printed on an HP Indigo Digital Press

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